Revisiting the Economic Performance and Institutions Debate in SSA Countries: The Role of Legal Origins in the Context of Ethnic Heterogeneity

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Revisiting the Economic Performance and Institutions Debate in SSA Countries: The Role of Legal Origins in the Context of Ethnic Heterogeneity

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Abstract

We contribute to the literature of economic performance and institutions by analysing how the interplay between historical legal roots and ethnic heterogeneity can determine current economic outcomes estimating various specifications of the national production function. Our empirical investigation includes a sample of 35 Sub-Saharan (SSA) countries which are typically characterised by a high degree of ethnic fragmentation, often emanating from haphazardly drawn colonial borders, while the legal systems in Africa have been exogenously implanted by the respective colonial powers. Our main results show that although the adoption of common British law (*Common*) is generally associated with better economic outcomes, in the presence of high ethnic heterogeneity the French civil law (*Civil*) outperforms British common law in terms of national economic performance because it is more effective in promoting political stability, and coordination. The latter characteristic is necessary for the efficient use of natural resources that are often abundant in SSA countries and constitute a major source of government revenue.

Keywords: Legal Origins, Ethnic Heterogeneity, GDP per Capita, Technical Efficiency, Sub-Saharan Africa
JEL classification: O47, O55

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1 Introduction

The paper aims at contributing to the debate on how historical aspects of the institutional framework drive the current process of development in Sub-Saharan Africa (SSA) countries – an issue recently reinvigorated by Michalopoulos and Papaioannou 2020. We focus on legal origins, which, we argue, largely embody the differences in the colonial style of the French and British colonizers in SSA countries. The colonial style has left a lasting legacy in the post-independence era shaping the current institutional frame, which governs the contemporary economic and social life in Africa (Blanton, Mason, and Athow 2001; Gennaioli and Rainer 2007; Michalopoulos and Papaioannou 2020). The two dominant types of legal systems in SSA are the British Common law (*Common*) and the French Civil law (*Civil*). The legacy of the colonial style and key features of the legal system of the colonizer have been transplanted into the colonies and maintained in the post-colonization period.[1] Essentially, each legal system represents a different variety of capitalism and a different way of handling socio-economic problems that matter for economic development, social cohesion, and political stability (La Porta, Silanes, and Shleifer 2008; Schiehll and Martins 2016; Schnyder, Siems, and Aguilera 2018). Although the existing literature has explored the role of legal origins, in general, on various aspects of economic life (La Porta et al. 1999; Acemoglu, Johnson, and Robinson 2012), it is yet scarce and inconclusive as to which legal tradition is more appropriate for economic development (Magnin 2018) as well as how country characteristics affect the performance of each legal tradition (Whitley 1999).

The literature suggests that institutional quality differences explain about three quarters of the differences in GDP per capita in the developing world (Acemoglu, Johnson, and Robinson 2001; Rodrik, Subramanian, and Trebbi 2004; Kaufmann, Kraay, and Mastruzzi 2009; Chang 2011).The main lesson from this empirical evidence is that institutions of better quality enhance investment in both physical and human capital, as well as promote the efficient use of national production inputs (Cavalcanti and Novo 2005; Alguacil, Cuadros, and Orts 2011). Within this context, legal origins reflect the colonial legacy and the historical input that shape at present the institutional environment in SSA former colonies. In our analysis, the impact of colonial legacy in the current socio-economic life help us to understand: (a) the country's capacity to resolve societal conflict (Blanton, Mason, and Athow 2001), and (b) country's effectiveness in utilizing natural resources (Maseland 2018).

[1]This transplantation includes the transmission of various bundles of codes, practices, and ideologies that largely represent the style of the coloniser. Some recent studies question the importance of legal origins and colonial style for current development placing more emphasis on democracy as an engine for economic development (Parent 2018). We argue that the quality of current institutions follows a historical path whose roots largely lie within colonial heritage as represented by legal origins. Evidence about the importance of legal origins for current institutional quality is also found in Emenalo, Gagliardi, and Hodgson 2018. Nonetheless our study provides a new perspective as to what country specific characteristics determine the effectiveness of different legal origins and colonial legacies. Our study provides a new perspective as to what country specific characteristics determine the effectiveness of different legal origins and colonial legacies.

Ethnic heterogeneity is widely recognised as a major source of societal conflict that threatens the cohesiveness of the society (Easterly and Levine 1997;Michalopoulos and Papaioannou 2020). Given the importance of ethnic heterogeneity in driving cross-country differences in economic development (Easterly and Levine 1997; Alesina et al. 2003; Bertocchi and Guerzoni 2012), we explore whether economic performance in SSA former colonies depends on the interaction of ethnic heterogeneity with colonial style. A key element of French colonial rule is the importance of a centralised state which subjects individuals from different ethnic groups under a central administration. In the colonial period, the French state represented a system of a centralised bureaucracy with very limited power to be assigned to local elites. It was within the power of the colonial state to decide about taxation, land and labour laws, without any assigning any intermediate role to local authorities. In the post-colonial period, the machinery of administration was taken over by a new (local) elite maintaining the same, colonial-like structure. In contrast to the French colonial legacy, the British style of colonialism was much less dependent on the central metropolitan power. The British government preferred to assign rights to local elites with the establishing of mediating networks that were in charge of the maintenance of the British rule and sovereignty (Wilson 1994). In independence, the new post colonial state adopted the specificities of the colonizer's legal prototype that became the main institutional vehicle for governing the socio-economic life.

The main objective of the present paper is to identify the capabilities of each legal system to handle effectively economic and societal problems that are related to ethnic fragmentation. Specifically, we investigate the role of French civil law and British common law as inherited institutional devices in the economic and political governance of SSA countries. We view as a major contribution of our paper the analysis of the combined effect of the legal origins and ethnic heterogeneity on national economic outcomes - a link that has not attracted attention in the literature despite its critical relevance for former colonies. While ethnic heterogeneity and legal origins have been studied separately and found to be important determinants of socio-economic outcomes (Hodler 2006; La Porta, Silanes, and Shleifer 2008), there is no study that focuses on the interplay between the two. Without studying the joint effect, our understanding of the implications of legal origins on current economic performance remains incomplete, as there are substantial differences in the way that civil and common law confront issues related to ethnic fragmentation. Our study is the first one that takes an integrated approach to the interaction of historical institutions (*Civil* vs. *Common*) with current societal characteristics which jointly determine the economic and welfare conditions in SSA countries. The rest of the paper is organised as follows: section 2 summarises the relevant literature on legal origins and ethnic fractionalisation and develops a conceptual framework to guide the empirical analysis that follows in section 3; section 4 concludes.

2 Theoretical Framework and Hypotheses Formulation

Hall and Jones 1999 provide compelling evidence that the differences in output per worker across countries are strongly associated with the differences in social infrastructure. The latter is defined as the combination of underlying institutions and public policies. Social infrastructure favourable to economic performance includes the minimisation of resource diversion and fair price setting, such that individuals capture the social returns to their actions as private returns (North and Thomas, 1973). In the spirit of Hayek, which is also endorsed in La Porta, Silanes, and Shleifer 2008, legal origins shape the basis of social infrastructure in governing the style of social and economic life.[2]

In African countries the legal system and the administrative structure was inherited from colonisers. We focus on the French civil law and the British common law as French and British are historically the major empires that exercised power in the SSA region. Coloniser's legal system was used to establish the administration and the machinery of social control in the colonial state, with the structure of this machinery maintained in its main principles in the post-colonial era. The French civil law has a centralised structure for controlling social and economic life. In the colonial era, France assimilated colonies under a centralised authority, which enacted legislation under the Presidential rule (Young 1994; Blanton, Mason, and Athow 2001). In independence, the post-colonial states maintained the same structure, whose main concern was to promote state-desired allocations of national resources and deal effectively with social disorder insuring that the state elites maintained the existing status quo.

The British common law system has a more decentralised orientation that favours private market outcomes to central concentration and state-controlled allocations. With reference to the colonial period, the British colonial style maintained indigenous elites as long as they could service the British colonial rule. [3] In independence, the British left in place an unranked system of social and ethnic stratification contrary to former French colonies, which sustained a more ranked system of social organisation (Blanton, Mason, and Athow 2001). Within our context, these distinct differences in colonial style were largerly predetermined by the legal system of the coloniser which was then adopted in the post-colonial era of the former colonies. More importantly, we show that the differences in colonial style and the underlying legal system imply different responses to societal conflict and disorder in the post-colonial era which in turn leads to different economic outcomes.

A major factor that significantly affects the likelihood of conflict and the degree of societal cohesiveness in the post-colonial period is ethnic heterogeneity (or fragmentation) (Bleaney

[2]Often, in studies focusing on the substantive law characteristics, legal origins are seen as measuring the quality of the judiciary and the security of property and contract rights.

[3]The style of the British coloniser could be accurately summarised into the "Divide and Rule" strategy. The logic of this strategy was to exploit possible differences among ethnic groups in order to prevent the formation of ethnic group alliances against the dominance of the coloniser.

and Dimico 2017).[4] Ethnic heterogeneity and tensions are particularly intense in Africa where colonial borders were drawn randomly without capturing particular local ethnic configuration and traditions (Michalopoulos and Papaioannou 2020). Ethnically heterogeneous societies may find it difficult to coordinate and agree on the use of resources and policy design. There is usually a high degree of political instability associated with ethnic heterogeneity, which weakens the organisation of the government. Murphy, Shleifer, and Vishny 1993 argue that ethnic heterogeneity weakens the centralisation of control, while Persson, Roland, and Tabellini 1997 point out to weakening of the useful checks and balances. [5] Weak political governance makes it harder to minimise resource diversion (Hodler 2006) and deal effectively with market failure (Alesina and Wacziarg 1998). [6]

In former French colonies, the elite that captures control of the state machinery in the post-colonial period has a monopolistic power in domestic politics. The state preserves a hegemonic role in manipulating and repressing any potential challenge against the existing status-quo (Gennaioli and Rainer 2007). However, in order to maintain power and political stability, the state provides better public policies and related subsistence guarantees, which is an inhibitory factor for non-state elites to challenge the existing regime (Blanton, Mason, and Athow 2001). [7] In former British colonies with an unranked system of social stratification, a pattern of severe competition has developed among ethnic groups aiming at gaining power over the state's institutional machinery. The elite that dominates over the state's functions controls the use of national resources and the revenue associated with them (Hodler 2006). Ethnic groups that are excluded from the state organisation, tend to mobilise (fragmented) structures for collective violent and non-violent action against the dominant elite, which results in conflict and higher political fragility (Bertocchi and Guerzoni 2012; Acemoglu, Robinson, and Torvik 2020).

A crucial political challenge for countries with a high degree of ethnic heterogeneity is to achieve the desired level of coordination in implementing the state's fundamental functions. In a decentralised set-up, as it occurs in former colonies with the British common law and ethnic homogeneity, the separation of powers (i.e. executive vs. judiciary) can and would

[4]Easterly and Levine 1997, Alesina et al. 2003 and Hodler 2006 show that ethnic heterogeneity in Africa explains a large part of cross-country differences in public policies and the economic outcomes resulted from them. These studies demonstrate that ethnic heterogeneity influences economic performance, and most of the effect works indirectly.

[5]According to the "political agenda" effect (Acemoglu, Robinson, and Torvik 2020) there should not be incentives for fragmented elites to create centralised power in the hands of a national state. This is because, in the absence of state centralization, citizens would not band together so elites can more easily keep control, while under state centralization citizens of different ethnicities would coordinate their demands in the direction of more general-interest public goods, and away from parochial transfers.

[6]See Easterly and Levine 1997 on how ethnic heterogeneity is linked to competitive rent-seeking, black-market premiums, poor financial development, low provision of infrastructure, and low levels of education.

[7]It is important to point out that the centralisation of the national state in the SSA context could sometimes be manifested in authoritarian regimes, but this is not necessarily a feature of the centralised national state per se; authoritarian regimes do also exist in common law SSA countries (i.e.Zimbabwe).

more easily coordinate decisions and actions of multiple government actors (La Porta, Silanes, and Shleifer 2008). In this case, the presence of effective checks and balances between the powers ensures good governance. For checks and balances to be effective two conditions must be fulfilled (Persson, Roland, and Tabellini 1997): (i) conflict of interest between the executive and the legislature and (ii) joint agreement on legislative decision-making by both bodies. A mere satisfaction of one of the two conditions does not suffice to improve accountability, both conditions must hold simultaneously.The existence of different ethnic groups with divergent interests in former British common law colonies makes condition (ii) unlikely to hold due to elites' divergent and competing interests in controlling national resources (Persson, Roland, and Tabellini 1997; Hodler 2006; Acemoglu, Robinson, and Torvik 2020). In other words, the limited ability of the (central) government to implement cohesive policies results in a bad national equilibrium, where different ethnic groups have contradicting interests and make independent claims on national resources. Therefore the lack of a strong centralised administration system in ethnically fragmented societies worsens accountability, and creates a "common-pool" problem with each ethnic group seeking the largest possible share until the national endowment is exhausted (Persson, Roland, and Tabellini 1997; Hodler 2006).

In summary, ethnic heterogeneity in former SSA colonies is a serious obstacle for achieving an optimal socio-political equilibrium that integrates the consensus from all different groups. On the grounds of difficulties associated with ethnic heterogeneity, different legal colonial legacies create different level of effectiveness in economic governance.

The decentralised system of governance in British common law countries results in a less stable economic environment with a high frequency of ethnic conflict, while the more centralised structure of administration in French civil law countries mitigates conflicts more effectively and ensures higher levels of political stability. In SSA countries under the French civil law, coordination among government actors is more likely to happen as dominant elites have already penetrated the state excluding any subordinate groups from mobilising forces that could potentially challenge the status quo. Based on the above arguments, we formulate our main hypotheses:

H1 Economic performance in ethnically heterogeneous societies is better enhanced under the French civil law where the centralised state is dominant and able to enforce coordination.

Two corollary hypotheses are also formulated from H1 that identify the supremacies of civil law over common law in providing better economic outcomes. This is mainly achieved through the channels of higher political stability and more effective use of natural resources. Thus, we specify two additional hypotheses:

H2 Former colonies under the French civil law maintain higher level of political stability that leads to better economic outcomes.

H3 Former colonies under the French civil law can more easily achieve coordination, which results in better utilisation of natural resources, and consequently a better national economic performance.

The following section tests empirically our hypotheses using two alternative econometric approaches. The first approach specifies a single-equation (baseline) model of income per capita similar to the regression framework used in the institutional literature. The novel element in our approach is the use of a new estimator that addresses systematically the time-invariant nature of the two variables of main interest - *Civil* and *Ethnic*. The second approach refers to the Stochastic Frontier Analysis (SFA), which estimates the production frontier of the 35 SSA countries. Within this framework, we can identify whether *Civil* and *Ethnic* (among other factors) contribute to the efficient use of national resources (i.e. improve inefficiency), thus closing the gap that separates each country from the best possible use of resources (i.e. the production frontier). Results from the two alternative estimation approaches provide ample evidence for drawing economic inference regarding the validity of our three hypotheses.

3 Empirical analysis

This section develops the empirical strategy of the paper. We test the conceptual propositions of the previous section in an unbalanced panel of 35 SSA countries over the period 1970-2013.[8]. We first report results from cross-country regressions that associate *Civil* with better governance outcomes relative to *Common* after controlling for ethnic heterogeneity. These regressions are conditional on the degree of ethnic heterogeneity (ethnic) in the country and its interaction with *Civil*.

Next, we develop the baseline econometric model that deals more systemically with the time fixed nature of civil and ethnic variables. In the second part of the empirical analysis, we estimate the production frontier in the sample of SSA countries investigating whether legal origins and ethnic heterogeneity, among other (economic) factors, are important determinants for explaining output deviations from the frontier.[9]

3.1. Illustrative Regressions.

Cross-country OLS regressions are used to illustrate the relationship between *Civil* and two notions of political stability. These regressions reflect upon our previous discussion that countries adopting civil law have a higher level of coordination, which results in higher political stability and lower conflict. We regress the mean values (1970-2013) of political stability (*Stability*) and conflict intensity of 35 SSA countries on time-invariant indices of *Civil* and *Ethnic*, and initial GDP per capita *GDPC70*. The first two specifications in Table 1, regress *Stability* on Civil, Ethnic and the interaction term *Civil* $\times$ *Ethnic*. *Stability* combines scores from various sources regarding perceptions about the likelihood that the government in power will be destabilised or overthrown by unconstitutional or other violent means (Worldwide Governance Indicators; Kaufmann, Kraay, and Mastruzzi 2009).The index runs from -2.5 to 2.5 with higher values corresponding to higher levels of political stability. *Civil* defined as a dummy with value one if the country adopts the French civil law and zero otherwise (La Porta et al. 1999).The reference category in *Civil* is the British common law. *Ethnic* is a time-invariant index defined as the probability of two random people in a country not sharing the same racial and linguistic characteristics (Alesina et al. 2003). *GDPC70* is income per capita in 1970 and accounts for initial conditions in each country (World Bank Development Indicators). Specification 3 and 4 in Table 1 regress an index of conflict intensity *Conflict*)(Stiftung 2014) on the same variables. *Conflict* ranges between 1 and 10 with low values indicating no violent incidents due to religious, ethnic, and social differences, while high values show widespread violent conflicts within

[8]The sample of countries include: Angola,Benin, Botswana, Burundi, Cameroon, Central African Republic, Chad, Congo, Cote d'Ivoire, Ethiopia, Gabon, Gambia, Ghana, Guinea-Bissau, Kenya, Lesotho, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Swaziland, Togo, Uganda United Republic of Tanzania, Zambia, Zimbabwe

[9]Deviations from the frontier are due to inefficient use of national resources. In other words, we seek to identify whether *civil* and *ethnic* are (in)efficiency related factors.

the society.

Regressions in Table 1 examine predictions for *Stability* and *Conflict* conditional on *Ethnic*, *Civil*, and *GDPC70* and they are identical to specifications used in the institutions and growth literature (Acemoglu, Robinson, and Torvik 2020; Acemoglu, Gallego, and Robinson 2014. We should note that *Ethnic* and *Civil* variables can be safely regarded as pre-determined in cross-sectional regressions.[10] If there were unobserved factors that influenced both colonial legacies and ethnic heterogeneity then the relations presented in Table 1 cannot be considered as causal, but even so, the conditional predictions are of interest in understanding how *Civil* and *Ethnic* drive cross-country differences in political stability and conflict outcomes.

Table 1: The Effect of Civil Law on Government Stability and Conflict, Cross-Country Regressions for 35 SSA Countries.Period Covered 1970-2013

	Stability	Stability	Conflict	Conflict
	(1)	(2)	(3)	(4)
Civil	0.070***	0.180***	-0.43**	-0.25**
	(0.07)	(0.09)	(0.06)	(0.02)
Ethnic	-0.192***	-0.373***	0.085***	0.093***
	(0.01)	(0.03)	(0.09)	(0.07)
Civil×Ethnic		0.208**		-0.086***
		(0.13)		(0.12)
GDPC70	0.268	0.114***	-0.018*	-0.009
	(0.37)	(0.04)	(0.12)	(0.16)
N	35	35	35	35
Adjusted R2	0.12	0.17	0.46	0.45
Log lik.	-24159	-24190	-20112	-20008

OLS beta coefficients with country robust standard errors in parentheses.
*** denotes 1% significance; ** denotes 5% significance; * denotes 10%.

OLS estimates in Table 1 are specified with country robust standard errors in parentheses. For each political variable in Table 1 we run two regressions – with and without the interaction term *Civil×Ethnic*. Countries under civil tend to have a higher level of political stability and lower conflict intensity. *Ethnic* decreases political stability and increases conflict intensity, whereas the interaction term implies that ethnically heterogeneous countries with *Civil*(i.e.a more centralised state) tend to be more politically stable and encounter lower conflict intensity. This cross-country evidence reinforces partly H1 and H2 in the sense that the French colonial legacy in conditions of ethnic heterogeneity tends to generate better outcomes of political governance. Our baseline econometric model in the next section addresses the time-invariant nature

[10]Legal origins are typically considered as valid instruments in the growth and financial development literature, see (Porta et al. 1998).

of *Civil* and *Ethnic* and provides further evidence about their combined effect on economic performance.

3.2. Estimation Strategy: The Baseline Model.

The main objective of the empirical model is to assess the effects of *Civil* and *Ethnic* on national output. We initiate our analysis with the specification of an aggregate production function:

$$Y_{it} = f(X_{it}^{'}\beta; C_i) \tag{1}$$

where Y is output and X is a vector of standard production inputs including capital stock (K), labour input(L) and human capital (H) in country i at year t. Parameters β are to be estimated. Variable C stands for country specific idiosyncrasies. In estimating (1), we encounter two notable challenges, first, *Civil* and *Ethnic* represent time invariant characteristics. This means that *Civil* and *Ethnic* cannot be disentangled from other individual unobserved fixed effects included in C_i. In this case, the use of a standard within fixed effect (WFE) estimator becomes inappropriate. Second, there is an issue of unobserved endogeneity bias between C_i and production inputs. Although OLS estimates for β parameters are unbiased in the presence of endogeneity, there is endogeneity bias between $Civil_i$, $Ethnic_i$ and Y_{it}. In a historical perspective, colonisation was not a random process, colonisers choose territories that fulfil specific requirements as far as natural resources, geographical proximity to ports, distance from the Atlantic and Indian oceans, and development conditions in the pre-colonisation era are concerned. Therefore, legal origins might not be totally exogenous or predetermined as argued in La Porta, Silanes, and Shleifer 2008.

To control for this type of endogeneity bias, we consider the fixed effects filter estimator (FEF) of Pesaran and Zhou 2018.The main steps of this static panel data estimator are outlined below:

$$y_{it} = a_i + x_{it}^{'}\beta + z_i^{'}\rho + \omega_{it} \tag{2}$$

where y_{it} is the log value of output, x_{it} is a vector with the log values of time variant regressors (k, l and h) and z_i is the vector of observed time-invariant regressors and ρ are parameters to be estimated. The model includes a unit unobserved heterogeneity parameter a that is decomposed as:

$$a_i = \alpha + \xi_i \tag{3}$$

The key issue in estimating (2) is to identify consistent parameters for ρ imposing restrictions on a_i. The FEF estimator produces parameters for ρ in two steps. In step one, a WFE estimator computes parameter values for the time-variant regressors x_{it}. These estimates are then used to filter out the time-varying effects. In a more compact form, the first step computes $\hat{\beta}$ and the associated residuals $\hat{u}$ are defined as: $\hat{u}_{it} = y_{it} - \hat{\beta}^{'} x_{it}$.

In step two, residuals from step one are averaged across units and regressed on an intercept

and a vector of time-invariant variables z: $\bar{\hat{u}}_i = \hat{\alpha}_{FEF} + \hat{\rho}'_{FEF} z_i$.

FEF estimator is found to be asymptotically consistent for a finite time sample and a sufficiently large number of observations like the structure of the present panel. Finally, the FEF estimator is robust in arbitrary heteroscedasticity and unbiased in the presence of serial correlation in ω_{it} (Pesaran and Zhou 2018). With reference to endogeneity, the FEF estimator remains valid even if the time-varying regressors x_{it} in (2) are not exogenous, $E(x_{it}, \xi_i \neq 0)$. This FEF property is rather appealing as the only requirement for obtaining consistent estimates for ρ is the use of possible time-invariant instruments outside the regressors specified in the model.[11]In the FEF-IV (instrumental variable) estimator, we instrument time-invariant regressors (z_i) with historical variables that mainly capture precolonial conditions in SSA countries. Specifically, the set of instruments include: the distance from the Sahara, the distance from the Atlantic, the population density in 1400 AD (Nunn 2008), and the state of development in the 19th century (Gennaioli and Rainer 2007).

3.3. Data Sources and Variable Definitions.

We estimate two variant specifications of (2), one in absolute levels (Table 2) and one in per-capita terms (Table 3); the data used are described next. Output (Y) is GDP in constant 2005 USD, capital stock (K) is derived from the accumulation of investment flows (*inv*) expressed in constant 2005 USD. The perpetual inventory equation for the capital stock series is: $K_{it} = (1-\delta)K_{it-1} + inv_{it-1}$, where δ is the rate of physical depreciation assumed to be constant across countries and years at 15%. The initial capital stock is derived from the steady state condition: $K_{0i} = inv_{0i}/(\bar{g}_i + \delta)$, where $\bar{g}_i$ is the average growth rate of investment in country i over the sample period and inv_{0i} is investment in the first year of the sample in each country. Labour (L) is the number of workers employed and human capital (H) is the average years of schooling for the population (15 years old and above). Data for Y, *inv*, L are taken from the Penn World Tables 8.0 (Feenstra, Inklaar, and Timmer 2015),while data for H are taken from the from Barro and Lee 2013 data set. Barro-Lee data are available in five years intervals; we generate values for years in between using linear interpolation (Klenow and Rodriguez-Clare 2005).*Civil* is taken from La Porta et al. 1999 and *Ethnic* heterogeneity is from Alesina et al. 2003.[12]Appendix A provides summary statistics of all variables used in the paper.

As a robustness test, we augment the per-capita specifications (Table 3) with additional regressors. Specifically, we consider *FDI* as a determinant that stimulates capital deepening and enhances technology transfer from multinational enterprises of advanced economies (Rodriguez and Rodrik 2000; Li and Liu 2005; Busse and Groizard 2008). We measure *FDI* as the share

[11]The FEF estimator builds upon the two-stage random effects estimator of Taylor and Hausman (TH) (1981). The main difference between FEF and TH is that the latter estimator requires time-varying regressors x_{it} (at least a sufficient number of them) to be exogenous, $E(x_{it}, \xi_i = 0)$, so they can be used as instruments for the time invariant regressors. The FEF estimator relaxes this exogeneity restriction.

[12]Or ethnic fractionalisation as it is originally labelled in Alesina et al. 2003.

of FDI inflows to GDP (FDI). *FDI* data are collected from various issues of the International Monetary Fund (IMF) and International Financial Statistics (IFS). Furthermore, we include the share of imports to GDP (*Trade*) and obtain the data from World Development Indicators (WDI). *Trade* contributes to the efficient allocation of resources through gains of specialisation as well as it helps developing countries to assimilate knowledge from trading partners (Bournakis, Christopoulos, and Mallick 2018). To account for the role of natural resource in SSA countries we use the sum of oil rents, natural gas rents, coal rents, mineral rents, and forestry rents as a share of GDP (*Resources*) and obtain the data from WDI. Finally, we consider whether the the degree of development of financial markets is a determinant of income per capita. The financial system is the mediator between savers and borrowers channelling credit into economic activities with high value-added and high rates of return ("Financial development and growth"). *Credit* is defined as the domestic credit to GDP and data are taken from WDI.

3.4. Baseline Estimation Results. Table 2 shows estimates from two parsimonious specifications, which include the coefficients of production inputs and two time-invariant factors, *Civil* and *Ethnic*. Regarding the coefficients of production inputs in (1), human capital(β_h) is the factor with the highest returns due to relatively higher scarcity, which leads to proportionally larger output increases after small increments in that input. In the FEF-IV estimation in (2), the size of the human capital coefficient decreases but it is still economically and statistically high. A similar pattern appears for the capital input (β_k). Turning to the coefficients of *Civil* and *Ethnic* both are negative and statistically significant. Recall, *Civil* is a dummy variable with reference group (i.e.the omitted category) countries with the British common law. The effects accord previous findings in the literature that emphasise the common stance about the supremacy of British common over French civil law in generating better economic outcomes for a number of reasons (La Porta, Silanes, and Shleifer 2008). [13] Similarly, *Ethnic* has a negative effect pointing out the distortions that ethnic fragmentation causes by preventing coordination that ensures an efficient allocation of national resources.

[13]The most prominent channel is that common law provides a more effective framework for the protection of property rights, which enhances private investment.

Table 2: Output Determinants in 35 SSA Countries 1970-2013:Fixed Effects Filter(FEF) and FEF-Instrumental(IV) Estimations

	FEF	FEF-IV
	(1)	(2)
Production Inputs		
β_k	0.321***	0.363***
	(0.042)	(0.047)
β_l	0.263**	0.226**
	(0.114)	(0.127)
β_h	0.34***	0.175**
	(0.033)	(0.08)
Time Invariant Determinants		
Civil	-1.16***	-2.60*
	(0.553)	(1.358)
Ethnic	-0.455***	-1.436*
	(0.276)	(0.784)
Civil×*Ethnic*	1.83***	3.866**
	(0.583)	(1.682)
Overall *Civil* Effect	0.102	0.068
Number of countries	35	32
Average number of years per country	43	44
N	1540	1408

Robust standard errors for arbitrary heteroscedasticity are shown in parentheses.

*** denotes 1% significance; ** denotes 5% significance; * denotes 10%.

The instruments used in the FEF-IV specification are the country's distance from the Sahara, the country's distance from the Atlantic,the population density in 1400 AD (Nunn 2008), and the state of development in the 19th century (Gennaioli and Rainer 2007).

Importantly, the interaction $Civil \times Ethnic$ provides a statistically significant and positive coefficient in both specifications. Coefficients from the FEF-IV estimators tend to be higher implying that estimates about time-invariant characteristics are downward biased without correcting for unobserved endogeneity bias. Intuitively, the positive sign of the interaction term suggests that the destabilising effect due to higher levels of ethnic heterogeneity can be better attenuated in countries with French civil law, in turn, leading to better economic outcomes. This result favours the suitability of the French civil law in an array of matters that are crucial for fragmented societies, including the functionality of government as well as the operation of the executive and judiciary authorities. Essentially, our results highlight the beneficial role

of a centralised system of governance in maintaining the status quo, which prevents (lack the incentives for) subordinate ethnic groups to undertake collective actions against the state. We reiterate here that some SSA countries might be classified as autocratic regimes but this should not be considered an artifact of the inherited colonial style. Furthermore, these results do not lead to the conclusion that countries with French civil law constitute better democracies, nonetheless as cross-country evidence in Table 1 suggests, societies following the French colonial legacy tend to suffer from less conflicts, which is undoubtedly beneficial for economic activity. Overall, Table 2 provides favourable evidence for H1.

To make economic sense of these results, we calculate the total effect of *Civil* from the partial derivative:

$$\frac{\partial y_{it}}{\partial Civil_i} = \hat{\rho}_1 + \hat{\rho}_2 Ethnic_i$$

If we evaluate *Ethnic* at the sample median of 0.69 then the overall effect of *Civil* is equal to 0.10 and 0.068 in the FEF and FEF-IV specifications,respectively. Given that y is in logs, these values represent semi-elasticities suggesting that a civil law country in SSA achieves, on average, 10.2% or 6.8% more output than a common law country. The results in Table 3 are from the output per person specification $y_{it} - l_{it}$. Four alternative specifications are shown-two parsimonious and two augmented with additional covariates.The coefficient of $\beta_{\frac{k}{l}}$ is larger than the coefficient of $\beta_{\frac{h}{l}}$. With reference to the variables of main interest, the coefficient of *Civil* in columns (1) and (2) remains negative, while the interaction term $Civil \times Ethnic$ is positive. Columns (3) and (4) include among others the covariates of *Resources* and *Stability* and their interactions with *Civil*. *Resources* is a negative determinant of output per worker, while the coefficient of the interaction $Civil \times Resources$ is positive.These results reinstate the importance of a centralised system of governance, which is a feature of countries with the French civil law, in managing problems associated with the tragedy of the natural endowments (Hodler 2006; Alao 2007).[14] A similar effect is also identified for the $Civil \times Stability$ variable. The overall effect of Civil in specifications (3) and (4) is derived from: $\frac{\partial y_{it}}{\partial Civil_i} = \hat{\rho}_1 + \hat{\rho}_2 Ethnic_i + \hat{\rho}_3 Resources_{it} + \hat{\rho}_4 Stability_{it}$. Evaluating *Ethnic*, *Resources* and *Stability* at the median, the overall effect of *Civil* is between 0.066 and 0.099, which indicates that a civil law country has on average 7-10% higher output per worker than a common law country. The overall impact of the French civil remains statistically and economically significant for income per capita in SSA countries, which validates H1, H2 and H3.

Other determinants in (3) and (4) in Table 3 include *Credit* which controls for the importance of financial markets in the development process. Financial expansion is beneficial for output as it increases the number of businesses that have access to finance. *Trade* is also a positive and statistically significant signifying the role of imported embodied technical change that enhances

[14]The tragedy of the endowments here refers to the struggle of developing countries that are rich in natural resources and fail to develop other factor such as human capital, sufficient manufacturing base that enable them to achieve a more sustainable path of development.

productivity in SSA countries. *FDI* is insignificant, a common result in developing countries, as multinationals often do not create strong ties with local economies that promote transfer of knowledge, rather targeting countries' natural resources and labour endowments. Finally, a time trend is included to capture exogenous (disembodied) technical change.

Table 3: Determinants of GDP per Capita in 35 SSA Countries 1970-2013. Fixed Effects Filter(FEF) and FEF-Instrumental (IV) Estimations

	FEF	FEF-IV	FEF	FEF-IV
	(1)	(2)	(3)	(4)
Production Inputs				
β_{k-l}	0.281***	0.264***	0.269***	0.253***
	(0.044)	(0.048)	(0.038)	(0.04)
β_{h-l}	0.154*	0.157*	0.154*	0.194**
	(0.085)	(0.086)	(0.087)	(0.085)
Resources			-0.003**	-0.007***
			(0.003)	(0.001)
Stability			0.052**	0.061***
			(0.02)	(0.01)
Civil×Resources			0.005**	0.004***
			(0.004	(0.002)
Civil×Stability			0.052**	0.061***
			(0.02)	(0.016)
Time Invariant Determinants				
Civil	-2.411***	-0.258*	-2.001***	-1.194***
	(0.667)	(1.297)	(0.644)	(0.278)
Ethnic	-2.092***	-1.425*	-2.685***	-1.281***
	(0.712	(0.953)	(0.615)	(0.85)
Civil×Ethnic	3.523***	3.838**	2.688**	1.633***
	(1.033)	(1.589)	(0.917)	(0.226)
Overall *Civil* Effect	0.095	0.068	0.072	0.153
Additional Determinants				
Credit			0.031**	0.018*
			(0.016)	(0.016)
Trade			0.110***	0.003**
			(0.003)	(0.000)
FDI			0.05	0.035
			(0.01)	(0.027)
Trend			-0.007***	-0.005**
			(0.002)	(0.002)
Number of Countries	35	32	35	32
N	1540	1408	1517	1254

Robust standard errors for arbitrary heteroscedasticity are shown in parentheses.

*** denotes 1% significance; ** denotes 5% significance; * denotes 10%.

The overall effect indicates the partial derivative of output with respect to *Civil*. See text for further details.

The instruments used in the FEF-IV specification are the country's distance from the Sahara,
the country's distance from the Atlantic,the population density in 1400 AD (Nunn 2008),
and the state of development in the 19th century (Gennaioli and Rainer 2007).

3.5. Stochastic Frontier Analysis.

In this section, we provide further evidence within a more comparative context presenting results from the production frontier of the SSA countries. We estimate the elasticity of national output with respect to labour, fixed capital and human capital, while within the same framework we identify the factors that prevent the efficient use of the inputs. The SFA defines technical efficiency as the production of maximum output given the bundle of production inputs and the state of technology. Subsequently, a country is technically efficient when it operates at the upper boundary of its production possibility frontier. Any distance from the frontier represents the degree of technical inefficiency in a country. The use of SFA for the purposes of our analysis has two distinct advantages compared to the restricted specification of output per capita shown in Tables 2 and 3. First, it measures each country's output relative to the international best practice (the frontier). Second, SFA decomposes the distance from the frontier into an inefficiency term and pure random noise. The inefficiency term is then modelled as a function of observed national characteristics, among them *Civil* and *Ethnic*. The production function in per capita terms in the SFA set up is formulated as:

$$(y-l)_{it} = \gamma_0 + \gamma_1(k-l)_{it} + \gamma_2(h-l)_{it} + \upsilon_{it} - u_{it} \tag{4}$$

As previously, lower case letters denote log values. The error component υ represents the standard statistical noise of the frontier with υ $N(0,\sigma^2)$, while u_{it} is a non-negative stochastic term N^+ (μ_{it},σ^2) with mean μ_{it} and constant variance. The term of interest in (4) is the one-sided technical inefficiency error term u_{it} driven by socio-economic factors:

$$\mu_{it} = Z_{it}^{'}\theta + \epsilon_{it} \tag{5}$$

where Z_{it} is the $p \times 1$ vector of technical inefficiency factors, θ is a $1 \times p$ vector of unknown parameters to be estimated; ϵ_{it} is a random error defined by the right truncation of a normal distribution with zero mean and variance: $\sigma^2 = \sigma_v^2 + \sigma_u^2$. Following Battese and Coelli 1995, we estimate production parameters γ and inefficiency parameters θ in one stage.[15]Regarding the inefficiency equation(5), we first consider a parsimonious specification, which is then augmented with additional variables. This strategy allows us to scrutinise the robustness of our results with respect to the main variables of interest- *Civil* and *Ethnic*. Three inefficiency equations are specified:

[15]Applications of the SFA with country level data can be found, among others, in Kneller and Stevens (2006) and Christopoulos and Leon-Ledesma (2014).

$$u_{it} = \theta_0 + \theta_1 Civil_i + \theta_2 Ethnic_i + \theta_3[Civil_i \times Ethnic_i] + \theta_4 trend_t + \epsilon_{it} \tag{5.1}$$

$$\begin{aligned} u_{it} = \theta_0 + \theta_1 Civil_i + \theta_2 Ethnic_i + \theta_3[Civil_i \times Ethnic_i] + \theta_4 trend_t + \\ + \theta_5 Stability_{it} + \theta_6[Civil_i \times Stability_{it}] + \theta_7 Credit_{it} + \theta_8 Trade_{it} + \epsilon_{it} \end{aligned} \tag{5.2}$$

$$\begin{aligned} u_{it} = \theta_0 + \theta_1 Civil_i + \theta_2 Ethnic_i + \theta_3[Civil_i \times Ethnic_i] + \theta_4 trend_t + \\ + \theta_7 Credit_{it} + \theta_8 Trade_{it} + \theta_9 Resources_{it} + \theta_{10}[Civil_i \times Resources_{it}] + \epsilon_{it} \end{aligned} \tag{5.3}$$

The parsimonious specification includes *Civil*, *Ethnic*, the interaction term between the two, and a time trend that captures exogenous technical change. Specification (5.2) includes *Credit*,*Trade*,*Stability* and the interaction term of the latter with *Civil*. Specification (5.3) includes interchangeably *Resources* and its interaction term with *Civil*. Specifications (5.2) and (5.3) are close approximations for H2 and H3, respectively.[16]

3.6. Efficiency Scores and Ethnic Heterogeneity.

Table 4 shows SFA estimates from the specifications (5.1)- (5.3) outlined above. The upper panel of the table shows the estimated coefficients of the frontier (4), while the lower panel shows the estimated parameters of the inefficiency equation (5). Since all specifications in Table 4 represent nested models, the Akaike information criterion (AIC) can be used to select the preferred specification. Accordingly, (5.2) provides the best fit of the data, so the interpretation of the results refers to coefficients from this specification.

[16] As a further test of robustness, Appendix C provides results from a Translog specification of the frontier and estimates from additional inefficiency determinants.

Table 4: SFA Production Function Estimates and Inefficiency Determinants 35 SSA Countries, 1970-2013

	(5.1)	(5.2)	(5.3)
Frontier			
γ_{k-l}	0.772***	0.708***	0.801***
	(0.01)	(0.01)	(0.01)
γ_{h-l}	0.114***	0.049**	0.141***
	(0.02)	(0.02)	(0.02)
Inefficiency			
Civil	0.934***	0.830***	0.893***
	(0.10)	(0.13)	(0.15)
Ethnic	1.063***	3.076***	2.065***
	(0.10)	(0.16)	(0.09)
Stability		-0.060***	
		(0.02)	
Resources			0.17***
			(0.00)
Credit		-0.069***	-0.104***
		(0.01)	(0.02)
Trade		-0.018***	-0.01***
		(0.00)	(0.00)
trend	0.055***	0.010***	0.009***
	(0.00)	(0.00)	(0.00)
$Civil \times Ethnic$	-2.862***	-2.988***	-2.044***
	(0.12)	(0.16)	(0.12)
$Civil \times Stability$		-0.246***	
		(0.02)	
$Civil \times Resources$			-0.12***
			(0.00)
Overall *Civil* Effect	-1.039	-1.993	-1.49
Observations	1540	1540	1540
AIC	1474.9	1313.3	1511.1
Log lik.	-729.43	-643.66	-742.55
Wald	6290.99	2451.01	5416.19
Wald-pvalue	0.00	0.00	0.00
λ	0.32	0.72	0.94

Standard errors are shown in parentheses.

***denotes 1% significance; ** denotes 10% significance;* denotes 10%

All specifications include time fixed effects in the frontier equation.

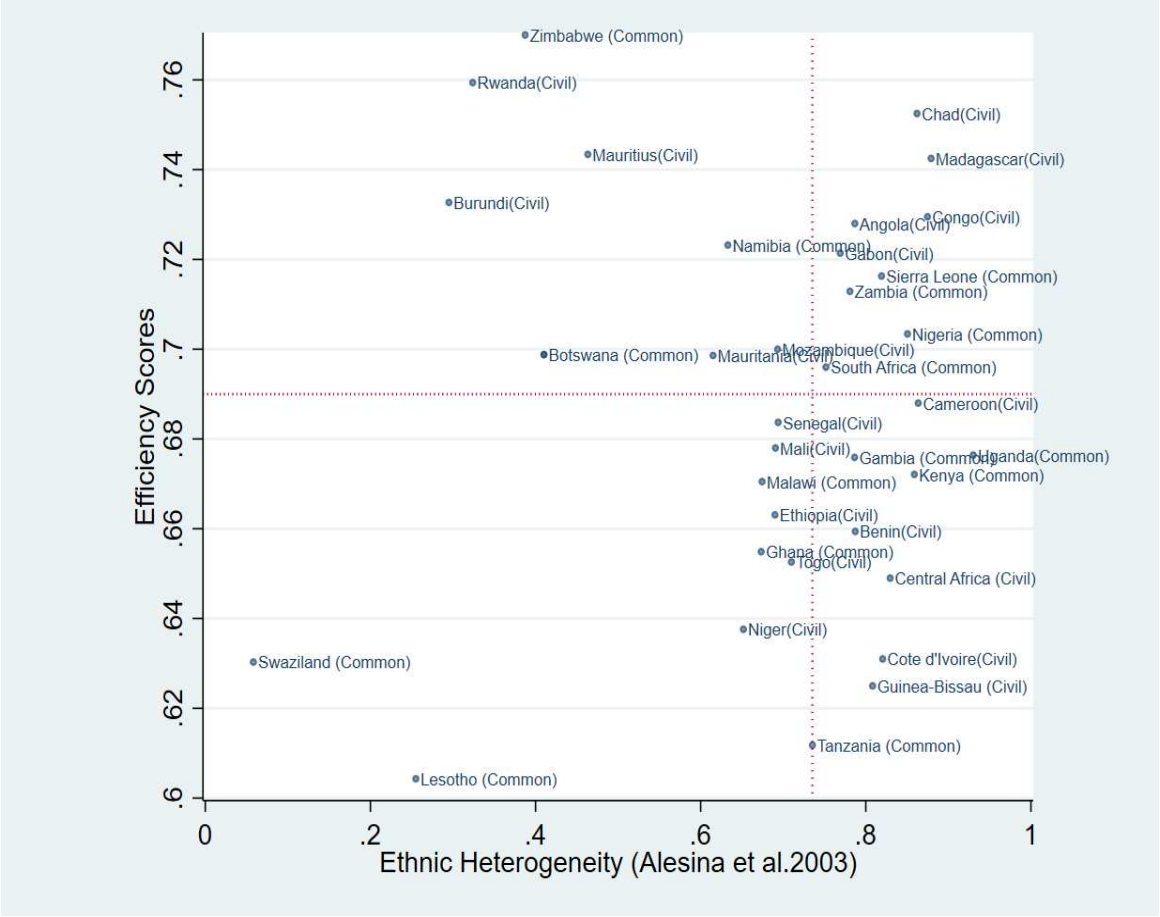
Wald test refers to the hypothesis that all estimated parameters in the inefficiency equation are jointly zero.

Parameter $\lambda = \dfrac{\sigma_u^2}{\sigma_v^2 + \sigma_u^2}$ at the bottom of Table 4 determines the proportion in the variation of $(y - l)$ that is due to technical inefficiency. The maximum likelihood (ML) estimates indicate that 72% of the variation in $u_{it} - v_{it}$ in (5.2) is attributed to technical inefficiency, so there is substantial scope to investigate further the sources of this inefficiency.

We first identify correlations between efficiency scores and the degree of ethnic heterogeneity. Sample means of technical efficiency (TE) for each country as derived from specification (5.2) are shown in Appendix B. The average efficiency score of the entire sample is 0.68.[17]. Zimbabwe, a British common law country and relatively ethnically homogeneous, has the highest efficiency level (0.77) in the sample. Rwanda, Chad, Madagascar, and Mauritius under French civil law are very close to the frontier too. Irrespective of colonial legacy, countries at the top of the efficiency ranking share the following common characteristics: low dependence on revenue from natural resources, high levels of human capital and high trade orientation (Sachs and Warner 1997; Easterly and Levine 1997).Figure 1 plots the average efficiency scores in each country against *Ethnic*.

[17]Not surprisingly, the efficiency scores in SSA countries are lower than figures reported for advanced economies (Christopoulos and León-Ledesma 2014). Current efficiency scores are closer to findings for other non-SSA developing countries (Henry, Kneller, and Milner 2009)

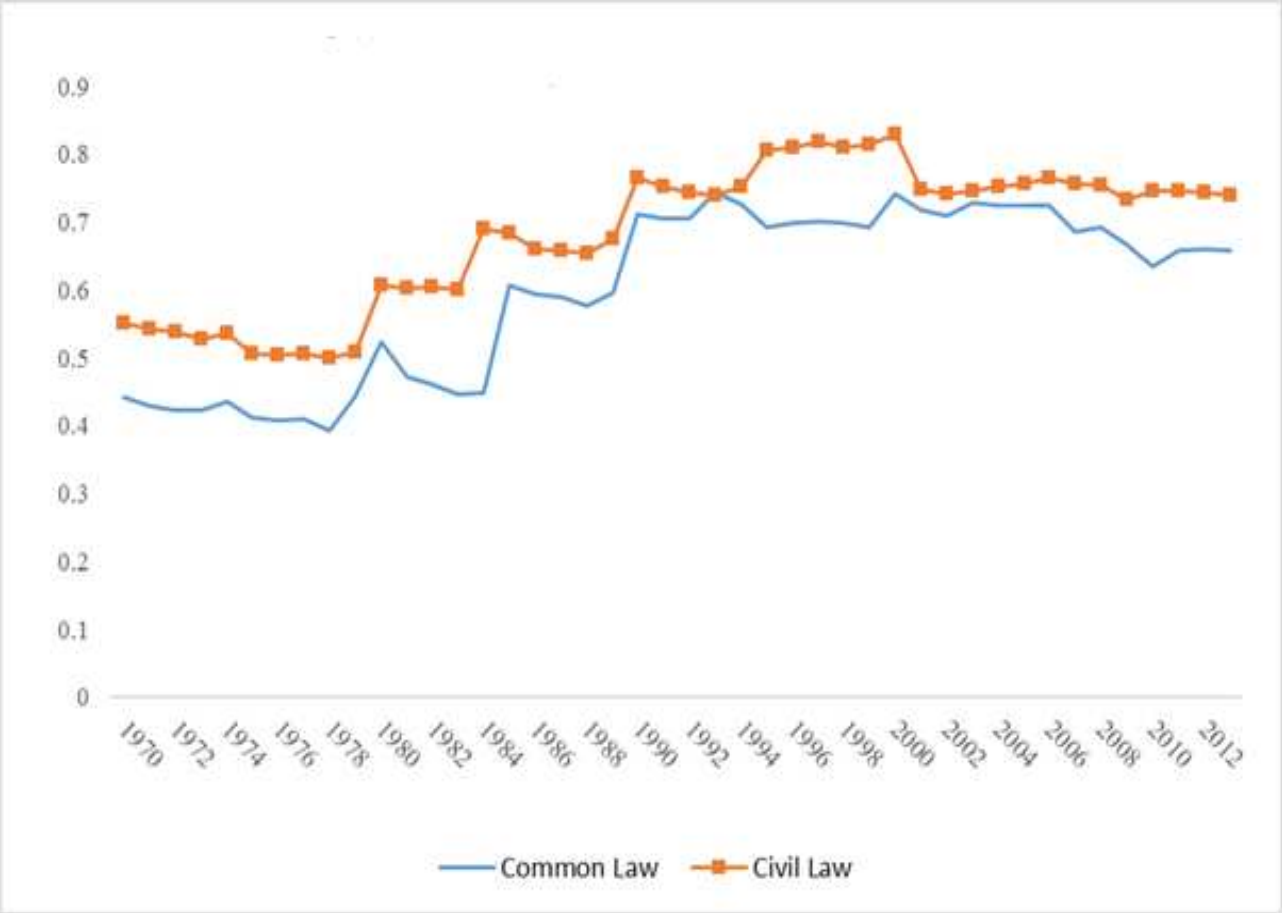
Figure 1: Efficiency Scores versus Ethnic Heterogeneity in 35 Sub Saharan African (SSA) Countries



Several points merit discussion; first, there is ample evidence of substantial ethnic heterogeneity in the SSA group. Most countries are placed around or to the right of the vertical (dashed) line which marks the sample median (0.73) of *Ethnic*. Second, the group of countries above the horizontal line and to the right of the vertical line are ethnically heterogeneous with high efficiency score, above the median (0.68). Most of the countries within this plot area belong to the civil law group (Chad, Madagascar, Congo at the top). Third, the bottom right of the graph includes countries with high ethnic heterogeneity and low average efficiency. Tanzania from the common law group has the worst performance with Cote d'Ivoire and Guinea-Bissau from the civil law group also close to the bottom. Despite technical efficiency following a similar trend in civil and common law countries since 1970 (Figure 2), civil law countries consistently dominate over common law countries in efficiency. On average, all countries in the sample experience efficiency losses close to 32%. Since, the 1980s and for about two decades, SSA countries improve efficiency substantially, while during the 2000s there was a period of stagnancy. After the 2000s, another downward trend is observed.[18]

[18]Botswana has improved performance substantially during the period with an average technical efficiency score of 0.47 in the 1970s which raised to 0.751 at the end of the period. Countries with an efficiency score in the

Figure 2: Efficiency Scores 1970-2013, 35 SSA Countries



3.7. Frontier and Inefficiency estimates.

Turning to the estimates of the frontier, γ_{k-l} and γ_{h-l} are both positive and statistically significant. The elasticity of capital per worker is around 0.7, while the human capital coefficient is close to 0.05. The size of the coefficient of capital per worker is high implying substantial output returns in SSA after increments in the relatively scarce capital.[19] Recall, Battese and Coelli 1995 specify technical efficiency as: $TE_{it} = exp(-u_{it} = exp(-Z_{it}\theta))$, which means that a negatively signed coefficient of theta is interpreted as an efficiency enhancer determinant (i.e. reduces inefficiency) or equivalently closes the output gap from the technical frontier. Regarding H1, the variable of main interest in Table 4 is the interaction term $Civil \times Ethnic$. Coefficients of the autonomous variables *Civil* and*Ethnic* maintain a pattern similar to the FEF and FEF-IV estimates in Table 3. Without considering its interplay with ethnic heterogeneity, British common law remains a legal system more favourable to economic outcomes (La Porta, Silanes, and Shleifer 2008). Similarly, the existence of ethnic heterogeneity is a considerable

1970s already close to the sample mean are Chad, Rwanda and Burundi that kept experiencing small efficiency gains during the period 1980-2000.

[19] Méon and Weill 2010 report coefficients for capital per worker no larger than 0.5 for group of countries at a more advanced level of development than SSA.

source of technical inefficiency. Nonetheless, the combined effect between the two is negative and highly significant in statistical terms, which supports H1. Evaluating the overall effect of *Civil* (5.2) at the median of *Ethnic* from:

$$\frac{\partial u_{it}}{\partial Civil_i} = \hat{\theta}_1 + \hat{\theta}_3 Ethnic + \hat{\theta}_6 Stability$$

countries with French civil law have 1.99% higher efficiency relative to countries with British common law. If we evaluate *Ethnic* in the 95% percentile of the sample distribution, the overall effect of *Civil* increases to 2.53%. This finding highlights a new perspective, which has been ignored to date, the interplay between colonial legacy and the degree of ethnic heterogeneity in SSA countries as a main socio-political driver of economic performance.

Table 5 calculates the total effect of key inefficiency determinants *Ethnic*, Stability and Resources. Overall, a 10% increases in ethnic heterogeneity increases inefficiency by 0.88 percentage points. This result accords well with our previous discussion that the quality of institutions is inclined to deteriorate from ethnic fragmentation, which impacts negatively on the effectiveness of economic governance. On the whole, *Stability* is a major efficiency enhancer as shown in Table 5 with a 10% increase in the likelihood of the government not being destabilised to signify efficiency gains at the order of 3 percent. This finding highlights the role of political stability as a catalyst for achieving better economic outcomes and even more stresses the need for an appropriate institutional environment that can promote it. Although the interaction term $Civil \times Resources$ is an efficiency enhancer (i.e. negative sign) as shown in Table 4, in the whole, *Resources* remain an inefficiency enhancer with a 10 percent increase in the revenue from natural resources to increase inefficiency by 0.5 percentage point. Despite the higher effectiveness of civil law in dealing with the management of natural resources, economic dependence on natural resources per se is a distortive factor that leads to rent-seeking practices and an uneven pattern of development. [20].

Table 5: Overall Elasticities, Specification (5.2)

	Elasticities
$E_{\mu,ethnic}$	0.088***
$E_{\mu,stability}$	-0.3**
$E_{\mu,resources}$	0.05**

Summarising our benchmark results in Table 4 for the role of colonial legacy - as it is represented by legal origins – in the national technical efficiency and allocation of production inputs, the centralized style of economic governance derived from the French colonial legacy through civil law is proved to be more effective in ethnically heterogeneous societies. Similarly, the French Civil law can more easily promote political stability and alleviate challenges

[20]Thus,undermining investment in human capital (Gylfason 2001; Galor and Mountford 2008) and expansion of the industrial base (Hodler 2006

related to the control of natural resources in SSA countries, even though, abundance in natural resource remains an obstacle to sustainable economic prosperity. The interpretation of our results concerning the superiority of the French colonial legacy in generating better economic outcomes in ethnically fragmented societies of SSA merits some conceptual caveats. First, the finding that countries under civil law are more politically stable does not necessarily mean that these societies are also pluralistic democracies, quite the opposite, these countries might have in place authoritarian regimes with a low degree of political competition. Second, the dominant groups that control state resources are powerful enough to protect the status quo from rebellions, nonetheless, this does not guarantee that mobilization against the state will never occur; it does sometimes occur and it might take a revolutionary form that aims at destroying state hegemony (Blanton, Mason, and Athow 2001; Acemoglu, Robinson, and Torvik 2020). Finally, *Trade* and *Credit* in Table 4 are efficiency enhancers. Trade stresses the importance of trade-embodied technical change, while the development of financial markets provides the credit channel needed for stimulating private investment. These results are consistent with estimates from the restricted specification of output per worker in Table 3. Similarly,(*trend*) shows that exogenous technical change is not an inefficiency enhancer in SSA countries. [21] Appendix C provides coefficients from a translog production function and the following inefficiency determinants: Polity2 (*Polity*), life expectancy (*Life*) and the share of manufacturing to GDP (*Man*). These are also found to be efficiency enhancing determinants but more importantly, results for Civil and *Civil* × *Ethnic* do not change.

3.8. Counterfactual Analysis.

To better assess the differences between *Civil* and *Common* in SSA countries, we provide a counterfactual analysis from the estimates shown in Table 4 with a comparison between actual and predicted efficiency scores in common law countries based on the overall effect of Civil. Specifically, we found in our preferred specification that countries adopting the civil law had on average 1.3% higher efficiency than SSA countries under common law. As a placebo exercise, we calculate the predicted initial score of efficiency in 1970 - the first year of the sample - assuming that common law countries had adopted the civil law, instead. Then we re-calculate the series of efficiency scores for Common law countries. We apply the following formula to initiate the predicted efficiency scores for Common law countries:

$$\hat{TE}_{it}^{Common} = (1 + \bar{g}_i^{Common})^n \times \hat{TE}_{i1970}^{Common} \tag{6}$$

where $\hat{TE}$ is the predicted technical efficiency, n is the number of years in the sample, g_i is the average growth rate of actual technical efficiency in common law country i over the sample period and $\hat{TE}_{i1970}$ is technical efficiency in 1970 for common law country i if it would

[21] Tehncial chnage in developing countries is either input biased or trade augmented as already shown in Danquah and Ouattara 2015 and Christopoulos and León-Ledesma 2014.

have adopted the civil law instead of common law. The actual average efficiency score for common law countries in 1970 is 0.443. The estimated efficiency differential between the two legal regimes is 1.99% implying that the predicted efficiency score for common law countries would have been 0.452 in 1970. From (7), predicted efficiency in Common law countries in 2013 would have been 0.83, while the actual is 0.65, thus Efficiency losses at the order of 22% (i.e., 1-(0.65/0.83)).[22]

4 Conclusions

We study the impact of coloniser's legal tradition on national efficiency of former African (SSA) colonies explicitly conditioning the effects on the degree of ethnic fragmentation. The colonial states were characterised by differential styles of political and economic governance in ruling their colonies. On the one hand, we have the more centralised state under the French civil law system, while on the other hand, we have the less decentralised state of the British common law system. We argue that the parsimonious and systematic way to capture the differences between styles of colonial governance is to see them through the lenses of legal origins. In that context, legal origins are the legal prototypes that were transplanted in the former colonies and maintained in the post-independence era. Our study is placed within the strand of literature that looks at how historical aspects of the institutional framework drive current outcomes in African countries. More importantly, differences in legal tradition have significant implications for how countries deal with ethnic heterogeneity and conflict. The degree of ethnic fragmentation in Africa countries is persistently high with substantial consequences on socio-economic outcomes. Therefore, it is important to understand how legal traditions interact with ethnic heterogeneity in shaping current economic performance. To our knowledge, our study is the first that explores the interplay between ethnic heterogeneity and legal origins within an integrated economic governance context.

Within a multi-faceted empirical analysis for 35 SSA countries over the period 1970-2010, we incorporate the role of legal origins and ethical heterogeneity, first within a standard income per capita regression framework and second, we study their effect as an in(efficiency) determinants within an aggregate production function. Two channels are identified through which civil law, drives economic outcomes. First, the French civil law system can enforce coordination better due to its centralised orientation, which leads to more efficient use of natural resources; and second, civil law tends to guarantee greater political stability. Our empirical analysis confirms that civil law delivers better economic outcomes in countries with a high degree of ethnic heterogeneity. Our findings contradict the standard belief to date that common law is universally the most appropriate legal framework for economic activity. The last point may well

[22] Appendix D shows the plots of actual versus predicted efficiency trends for the sub-sample of Common law SSA countries.

be true if one neglects ethnic heterogeneity. However, in countries with inherited substantial ethnic fragmentation centralised administration handles better social and ethnic conflicts, which is undoubtedly beneficial for the use of natural resources and national inputs. We should, of course, mention that there is possibly a cost of greater political stability, under French civil law relative to British common law, that of a less pluralistic and institutional democracy. As far as the role of other traditional economic factors is concerned, human capital, trade and a well-functioning financial market are equally important in the economic growth process.

References

Acemoglu, Daron, Francisco A Gallego, and James A Robinson (2014). "Institutions, human capital, and development". In: *Annu. Rev. Econ.* 6.1, pp. 875–912.

Acemoglu, Daron, Simon Johnson, and James A Robinson (2001). "The colonial origins of comparative development: An empirical investigation". In: *American economic review* 91.5, pp. 1369–1401.

— (2012). "The colonial origins of comparative development: An empirical investigation: Reply". In: *American Economic Review* 102.6, pp. 3077–3110.

Acemoglu, Daron, James A Robinson, and Ragnar Torvik (2020). "The political agenda effect and state centralization". In: *Journal of Comparative Economics* 48.4, pp. 749–778.

Alao, Abiodun (2007). *Natural resources and conflict in Africa: the tragedy of endowment*. Vol. 29. University Rochester Press.

Alesina, Alberto and Romain Wacziarg (1998). "Openness, country size and government". In: *Journal of public Economics* 69.3, pp. 305–321.

Alesina, Alberto et al. (2003). "Fractionalization". In: *Journal of Economic growth* 8.2, pp. 155–194.

Alguacil, Maite, Ana Cuadros, and Vicente Orts (2011). "Inward FDI and growth: The role of macroeconomic and institutional environment". In: *Journal of Policy Modeling* 33.3, pp. 481–496.

Barro, Robert J and Jong Wha Lee (2013). "A new data set of educational attainment in the world, 1950–2010". In: *Journal of development economics* 104, pp. 184–198.

Battese, George Edward and Tim J Coelli (1995). "A model for technical inefficiency effects in a stochastic frontier production function for panel data". In: *Empirical economics* 20.2, pp. 325–332.

Bertocchi, Graziella and Andrea Guerzoni (2012). "Growth, history, or institutions: What explains state fragility in sub-Saharan Africa?" In: *Journal of Peace Research* 49.6, pp. 769–783.

Blanton, Robert, T David Mason, and Brian Athow (2001). "Colonial style and post-colonial ethnic conflict in Africa". In: *Journal of Peace Research* 38.4, pp. 473–491.

Bleaney, Michael and Arcangelo Dimico (2017). "Ethnic diversity and conflict". In: *Journal of Institutional Economics* 13.2, pp. 357–378.

Bournakis, Ioannis, Dimitris Christopoulos, and Sushanta Mallick (2018). "Knowledge spillovers and output per worker: an industry-level analysis for OECD countries". In: *Economic Inquiry* 56.2, pp. 1028–1046.

Busse, Matthias and José L Groizard (2008). "Technology trade in economic development". In: *World Economy* 31.4, pp. 569–592.

Cavalcanti, Tiago V de V and Alvaro A Novo (2005). "Institutions and economic development: How strong is the relation?" In: *Empirical economics* 30.2, pp. 263–276.

Chang, Ha-Joon (2011). "Institutions and economic development: theory, policy and history". In: *Journal of institutional economics* 7.4, pp. 473–498.

Christopoulos, Dimitris K and Miguel A León-Ledesma (2014). "Efficiency and production frontiers in the aftermath of recessions: international evidence". In: *Macroeconomic Dynamics* 18.6, pp. 1326–1350.

Danquah, Michael and Bazoumana Ouattara (2015). "What drives national efficiency in sub-Saharan Africa". In: *Economic Modelling* 44, pp. 171–179.

Easterly, William and Ross Levine (1997). "Africa's growth tragedy: policies and ethnic divisions". In: *The quarterly journal of economics* 112.4, pp. 1203–1250.

Emenalo, Chukwunonye O, Francesca Gagliardi, and Geoffrey M Hodgson (2018). "Historical institutional determinants of financial system development in Africa". In: *Journal of Institutional Economics* 14.2, pp. 345–372.

Feenstra, Robert C, Robert Inklaar, and Marcel P Timmer (2015). "The next generation of the Penn World Table". In: *American economic review* 105.10, pp. 3150–82.

Galor, Oded and Andrew Mountford (2008). "Trading population for productivity: theory and evidence". In: *The Review of economic studies* 75.4, pp. 1143–1179.

Gennaioli, Nicola and Ilia Rainer (2007). "The modern impact of precolonial centralization in Africa". In: *Journal of Economic Growth* 12.3, pp. 185–234.

Gylfason, Thorvaldur (2001). "Natural resources, education, and economic development". In: *European economic review* 45.4-6, pp. 847–859.

Hall, Robert E and Charles I Jones (1999). "Why do some countries produce so much more output per worker than others?" In: *The quarterly journal of economics* 114.1, pp. 83–116.

Henry, Michael, Richard Kneller, and Chris Milner (2009). "Trade, technology transfer and national efficiency in developing countries". In: *European Economic Review* 53.2, pp. 237–254.

Hodler, Roland (2006). "The curse of natural resources in fractionalized countries". In: *European Economic Review* 50.6, pp. 1367–1386.

Kaufmann, Daniel, Aart Kraay, and Massimo Mastruzzi (2009). "Governance matters VIII: aggregate and individual governance indicators, 1996-2008". In: *World bank policy research working paper* 4978.

Klenow, Peter J and Andres Rodriguez-Clare (2005). "Externalities and growth". In: *Handbook of economic growth* 1, pp. 817–861.

La Porta, Rafael, Florencio Lopez-de Silanes, and Andrei Shleifer (2008). "The economic consequences of legal origins". In: *Journal of economic literature* 46.2, pp. 285–332.

La Porta, Rafael et al. (1999). "The quality of government". In: *The Journal of Law, Economics, and Organization* 15.1, pp. 222–279.

Li, Xiaoying and Xiaming Liu (2005). "Foreign direct investment and economic growth: an increasingly endogenous relationship". In: *World development* 33.3, pp. 393–407.

Magnin, Eric (2018). "Varieties of Capitalism and Sustainable Development: Institutional Complementarity Dynamics or Radical Change in the Hierarchy of Institutions?" In: *Journal of economic issues* 52.4, pp. 1143–1158.

Marshall, Monty G, Ted Robert Gurr, and Keith Jaggers (2014). "Polity IV project: Political regime characteristics and transitions, 1800–2013". In: *Center for Systemic Peace* 5.

Maseland, Robbert (2018). "Is colonialism history? The declining impact of colonial legacies on African institutional and economic development". In: *Journal of Institutional Economics* 14.2, pp. 259–287.

Méon, Pierre-Guillaume and Laurent Weill (2010). "Is corruption an efficient grease?" In: *World development* 38.3, pp. 244–259.

Michalopoulos, Stelios and Elias Papaioannou (2020). "Historical legacies and African development". In: *Journal of Economic Literature* 58.1, pp. 53–128.

Murphy, Kevin M, Andrei Shleifer, and Robert W Vishny (1993). "Why is rent-seeking so costly to growth?" In: *The American Economic Review* 83.2, pp. 409–414.

Nunn, Nathan (2008). "The long-term effects of Africa's slave trades". In: *The Quarterly Journal of Economics* 123.1, pp. 139–176.

Parent, Antoine (2018). "Introduction to the Special Issue on colonial institutions and African development". In: *Journal of Institutional Economics* 14.2, pp. 197–205.

Persson, Torsten, Gerard Roland, and Guido Tabellini (1997). "Separation of powers and political accountability". In: *The Quarterly Journal of Economics* 112.4, pp. 1163–1202.

Persson, Torsten, Guido Tabellini, and Francesco Trebbi (2003). "Electoral rules and corruption". In: *journal of the European Economic Association* 1.4, pp. 958–989.

Pesaran, M Hashem and Qiankun Zhou (2018). "Estimation of time-invariant effects in static panel data models". In: *Econometric Reviews* 37.10, pp. 1137–1171.

Porta, Rafael La et al. (1998). "Law and finance". In: *Journal of political economy* 106.6, pp. 1113–1155.

Rajan, Raghuram and Luigi Zingales. "Financial development and growth". In: *American Economic Review* 88.3 ().

Rodriguez, Francisco and Dani Rodrik (2000). "Trade policy and economic growth: a skeptic's guide to the cross-national evidence". In: *NBER macroeconomics annual* 15, pp. 261–325.

Rodrik, Dani, Arvind Subramanian, and Francesco Trebbi (2004). "Institutions rule: the primacy of institutions over geography and integration in economic development". In: *Journal of economic growth* 9.2, pp. 131–165.

Sachs, Jeffrey D and Andrew M Warner (1997). "Sources of slow growth in African economies". In: *Journal of African economies* 6.3, pp. 335–376.

Schiehll, Eduardo and Henrique Castro Martins (2016). "Cross-national governance research: A systematic review and assessment". In: *Corporate Governance: An International Review* 24.3, pp. 181–199.

Schnyder, Gerhard, Mathias Siems, and Ruth V Aguilera (2018). "Twenty years of 'Law and Finance': time to take law seriously". In: *Socio-Economic Review*.

Stiftung, Bertelsmann (2014). *A World in Transition*. Verlag Bertelsmann Stiftung.

Whitley, Richard (1999). *Divergent capitalisms: The social structuring and change of business systems*. OUP Oxford.

Young, Crawford (1994). "9. The Afterlife of the African Colonial State: Concluding Reflections". In: *The African Colonial State in Comparative Perspective*. Yale University Press, pp. 282–292.

Appendices

Appendix A: Summary Statistics

Variable	Mean	SD	Min	Max	Source
y	3.83	0.66	0.66	5.72	PWT 8.0
k	3.79	0.53	0.73	5.77	PWT 8.0
l	3.29	0.73	0.53	4.38	PWT 8.0
h	0.54	0.29	-0.54	1.03	Barro and Lee 2013
Civil	0.53	0.50	0.00	1.00	La Porta et al. 1999
Ethnic	0.63	0.22	0.04	0.93	Alesina et al. 2003
Resources	14.83	15.77	0.03	85.82	WDI
FDI	8.75	17.65	0.00	251.59	WDI
Trade	40.34	24.48	2.04	250.50	WDI
Credit	30.98	41.07	0.00	300.08	WDI
Stability	-0.10	1.00	-1.92	1.97	Kaufmann, Kraay, and Mastruzzi 2009
Conflict	5.05	2.13	1.00	10.00	Stiftung 2014
Polity	-2.78	6.09	-10.00	10.00	Persson, Tabellini, and Trebbi 2003
Life	55.87	10.33	27.08	80.13	WDI
Man	11.50	6.34	0.89	41.72	WDI

Appendix B: Average Efficiency Scores, Legal Origins and Ethnic Heterogeneity

Country(Legal Origin)	Efficiency	Ethnic
Zimbabwe (Common)	0.7700	0.3874
Rwanda(Civil)	0.7594	0.3238
Chad(Civil)	0.7525	0.8620
Mauritius(Civil)	0.7434	0.4634
Nigeria (Common)	0.7034	0.8505
Burundi(Civil)	0.7327	0.2951
Zambia (Common)	0.7129	0.7808
Namibia (Common)	0.7232	0.6329
Angola(Civil)	0.7280	0.7867
Sierra Leone (Common)	0.7163	0.8191
Gabon(Civil)	0.7214	0.7690
South Africa (Common)	0.6960	0.7517
Gambia (Common)	0.6759	0.7864
Mozambique(Civil)	0.7000	0.6932
Botswana (Common)	0.6988	0.4102
Congo(Civil)	0.7295	0.8747
Cameroon(Civil)	0.6880	0.8635
Mauritania(Civil)	0.6986	0.6150
Senegal(Civil)	0.6837	0.6939
Mali(Civil)	0.6780	0.6906
Uganda(Common)	0.6764	0.9302
Kenya (Common)	0.6721	0.8588
Malawi (Common)	0.6705	0.6744
Ethiopia(Civil)	0.6631	0.6900
Benin(Civil)	0.6594	0.7872
Ghana (Common)	0.6549	0.6733
Togo(Civil)	0.6526	0.7099
Central Africa (Civil)	0.6490	0.8295
Madagascar(Civil)	0.7425	0.8791
Niger(Civil)	0.6376	0.6518
Swaziland (Common)	0.6303	0.0582
Cote d'Ivoire(Civil)	0.6310	0.8204
Guinea-Bissau (Civil)	0.6250	0.8082
Tanzania (Common)	0.6118	0.7353
Lesotho (Common)	0.6043	0.2550
Median	0.6880	0.7353
Average	0.6883	0.6775

Appendix C: Additional Specifications

Translog Specification of the National Production Function with *Polity*, *Life* and *Man* as Efficiency Determinants

	C1	C2
Frontier		
γ_k	0.782***	0.820***
	(0.01)	(0.01)
γ_l	0.151***	0.374***
	(0.02)	(0.02)
γ_h	0.230***	0.378***
	(0.03)	(0.05)
γ_{lh}		0.169**
		(0.08)
γ_{kl}		-0.077***
		(0.03)
γ_{kh}		0.135***
		(0.05)
γ_{kk}		0.148***
		(0.01)
γ_{ll}		0.170***
		(0.02)
γ_{hh}		0.118**
		(0.05)
T		-0.014***
		(0.00)
TT		-0.002
		(0.00)
Inefficiency		
Civil	0.830***	1.561***
	(0.09)	(0.17)
Ethnic	1.059***	1.543***
	(0.09)	(0.21)
Civil × *Ethnic*	-1.888***	-2.321***
	(0.11)	(0.20)
Resources		0.001
		(0.00)
Credit		-0.017***
		(0.01)
Trade		-0.004***
		(0.00)
Polity		-0.022**
		(0.00)
Life		-0.52***
		(0.00)
Man		0.002
		(0.00)
Observations	1540	1540
AIC	1367.5	-86.4
Log lik.	-631.73	110.21
Wald	7659.83	12743.44
Wald_p	0	0.77
λ	0.57	0.87

Standard errors are shown in parentheses.

***denotes 1% significance; ** denotes 10% significance;* denotes 10%

All specifications include time fixed effects in the frontier equation.

Polity variable measures the quality of democracy in a society.

The index of *Polity* takes values from -10(strongly autocratic regime) to +10 (strongly democratic regime).

We refer to Persson, Tabellini, and Trebbi 2003 and Marshall, Gurr, and Jaggers 2014 for further discussion.

Wald test refers to the hypothesis that all estimated parameters in the inefficiency equation are jointly zero.

Appendix D: Actual and Predicted Efficiency in Common Law Countries